### The following site is being submitted for inclusion into the Soil GIS registry:

- For DNR County and Region list go to: g:\pf\pecfa\site\gis\BRRTS County and Region Codes.xls
- To begin, click on cell to the right of; This is a:
- Use Tab, ↓ or Pg Down to navigate form. Print & include with file when completed.

This is a:	New Submittal
BRRTS ID (no dashes):	0313119840
Comm # (no dashes):	53562120201
County:	Dane
Region:	South Central
Site name:	PDQ Food Store #119
Street Address:	5301 South Ridge Way
City:	Middleton
Final Closure Date	2002-12-30
Closure Conditions:	met
Off-source property contamination?	No
f yes, attach locational data and deed information on pg. 2)	
Right-of-way contamination?	No
Contaminated media:	Soil
GPS Coordinates (meters in the	WTM91 projection)
Easting (X):	562976
Northing (Y):	293470
Collection Method:	DNR Web Site
Scale or Resolution:	1:3,839
1:24,000 scale or finer)	
Prepared by:	Ralph Smith
Submitted by:	Cheryl Nelson

### Source Property Checklist

 $\boxtimes$ 

$\boxtimes$	Copy of the most recent deed, which includes legal description for all properties with soil
	contamination above NR 720 RCL's.
$\boxtimes$	Where the legal description in the deed(s) refers to a certified survey man or recorded also

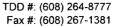
- Where the legal description in the deed(s) refers to a certified survey map or recorded plat map, include those documents
- Parcel ID for all properties with soil contamination above NR 720 RCL's.
- ⊠ General Location Map

Final Closure Letter

- Detailed Location Map showing property boundaries, buildings, MW(s) and/or potable wells etc for properties with soil contamination above NR 720 RCL's.
- Latest Map(s) showing extent of the soil contamination (isoconcentrations)
- Map showing GW flow direction
- Table of soil results from the site investigation and remedial action (if any).
- Geologic cross section (if generated as part of the site investigation)
- Statement signed by RP certifying correctness of legal descriptions

P.O. Box 8044

Madison, Wisconsin 53708-8044







December 30, 2002

Dawn Lucas PDQ Food Stores Inc 8383 Greenway Boulevard PO Box 620997 Middleton, WI 53562-0997

RE:

**Final Closure** 

**Commerce # 53562-1202-01** WDNR BRRTS # 03-13-119840 PDQ Food Store #119, 5301 South Ridge Way, Middleton

Dear Ms. Lucas:

The Wisconsin Department of Commerce (Commerce) has received all items required for closure of the site referenced above. This site is now listed as "closed" on the Commerce database and will be included on the Wisconsin Department of Natural Resources (WDNR) Geographic Information System (GIS) Registry of Closed Remediation Sites to address residual contamination.

It is in your best interest to keep all documentation related to the environmental activities at your site. If residual contamination is encountered in the future, appropriate measures must be implemented to assure that it is managed following all applicable regulations. If future site conditions indicate that any remaining contamination poses a threat, and subsequent information indicates a need to reopen this case, any original claim under the PECFA fund would also reopen and you may apply for assistance to the extent of remaining eligibility.

Thank you for your efforts to protect Wisconsin's environment. If you have any questions, please contact me in writing at the letterhead address or by telephone at (608) 261-6543.

Sincerely,

Ralph N. Smith Hydrogeologist

Site Review Section

Bagan Vi Smith

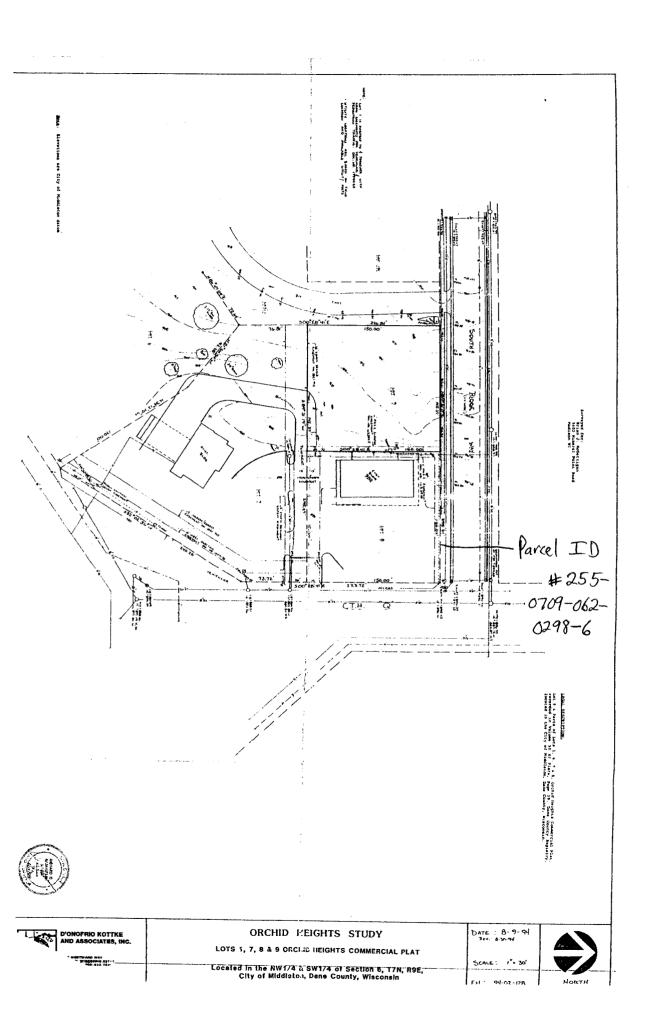
CC:

Jeff Vandenbusch - Terracon

Case File

1642237	STATE BAR OF WISCONSIN FORM 2  WARRANTY DEED. A P.  THIS SPREEZERVED FOR WELFRONIS DATA
TOTIZO/ THE THE PROPERTY OF TH	DANE COUNTY, WIS. SS RECORDED ON
PDO_CORPORATION, a Wisconsin corporation	ALCO NO DE
	79 OCT T A 9: 11
conveys and warrants toWRSPR Partnership	
	سال کی در
	negistor of Doeds
	2725 Lyman Lane
the following described real estate in Dane Coun	2725 Lyman Lane <sub>ty,</sub> Madison, WI_53711
State of Wisconsin:	The King Ma
,	Tax Key No
•	
	•
Lot Eight (8), Orchid Heights Co	mmercial
Plat, in the City of Middleton	
••	
TRANSFER	
\$ 200.00	·
FEE PAID	
This i.g. not homestead property.  (is) (is not)	
(is) (is not)	s of record
(is) (is not)	s of record
(is) (is not)  Exception to warranties: easements and restriction	s of record
(is) (is not)  Exception to warranties: easements and restriction	s of record
(is) (is not)  Exception to warranties: easements and restriction  Dated this 28th day of	
(is) (is not)  Exception to warranties: easements and restriction  Dated this 28th day of Septemb	er
(is) (is not)  Exception to warranties: easements and restriction  Dated this	RATION (SEAL)
(is) (is not)  Exception to warranties: easements and restriction  Dated this 28th day of Septemb  PDQ COMPO  (SEAL) By: Richar	RATION (SEAL) d A. Meyer, Treasurer
(is) (is not)  Exception to warranties: easements and restriction  Dated this 28th day of Septemb  PDQ COMPO  (SEAL) By:  Richar  (SEAL) Attest	RATION 19.79 (SEAL)  Id A. Meyer, Treasurer  The Fieley (SEAL)
(is) (is not)  Exception to warranties: easements and restriction  Dated this 28th day of Septemb  PDQ COMPO  (SEAL) By:  Richar  (SEAL) Attest	RATION (SEAL) d A. Meyer, Treasurer
(is) (is not)  Exception to warranties: easements and restriction  Dated this 28th day of Septemb  PDQ COXPO  (SEAL) By:  Richar  (SEAL) Attest	RATION (SEAL)  d A. Meyer, Treasurer  July (SEAL)  ou Greeley, Secretary
(is) (is not)  Exception to warranties: easements and restriction  Dated this 28th day of Septemb  PDQ COXPO  (SEAL) By:  Richar  (SEAL) Attest	RATION, 19.79 (SEAL)  d A. Meyer, Treasurer  July (SEAL)  ou Greeley, Secretary
(is) (is not)  Exception to warranties: easements and restriction  Dated this 28th day of Septemb  PDQ COMPO  (SEAL) By: Richar  (SEAL) Attest  AUTHENTICATION Signatures authenticated this day of STATE OF WI	RATION  (SEAL)  d A. Meyer, Treasurer  (SEAL)  ou. Greeley Secretary  KNOWLEDGMENT  SCONSIN
(is) (is not)  Exception to warranties: easements and restriction  Dated this 28th day of Septemb  PDQ COMPO  (SEAL) By: Richar  (SEAL) Attest Mary L  AUTHENTICATION AC  Signatures authenticated this day of STATE OF WI	RATION  (SEAL)  d A. Meyer, Treasurer  (SEAL)  ou Greeley, Secretary  KNOWLEDGMENT  SCONSIN
(is) (is not)  Exception to warranties: easements and restriction  Dated this 28th day of Septemb  PDQ COMPO  (SEAL) By:  Richar  (SEAL) Attest  Mary L  AUTHENTICATION AC  Signatures authenticated this day of STATE OF WI  Personally  September	RATION  (SEAL)  d A. Meyer, Treasurer  (SEAL)  ou Greeley. Secretary  KNOWLEDGMENT  SCONSIN  15.  County.  County.  Teamphofore me, this 28thday of
(is) (is not)  Exception to warranties: easements and restriction  Dated this	RATION  (SEAL)  d A. Meyer, Treasurer  (SEAL)  ou Greeley, Secretary  (KNOWLEDGMENT  SCONSIN  (SEAL)
(is) (is not)  Exception to warranties: easements and restriction  Dated this	RATION  (SEAL)  (SEAL)  (SEAL)  (SEAL)  OU Greeley Secretary
(is) (is not)  Exception to warranties: easements and restriction  Dated this 28th day of Septemb  PDQ COMO  (SEAL) By:  Richar  (SEAL) Attest  Mary L  AUTHENTICATION AC  Signatures authenticated this day of STATE OF WI  Dana  Personally  September  A. Meyer,  (If not,  authorized by § 706.06, Wis. Stats.)  Compared to the service of	RATION  (SEAL)  d A. Meyer, Treasurer  (SEAL)  ou Greeley, Secretary  (SEAL)
(is) (is not)  Exception to warranties: easements and restriction  Dated this 28th day of Septemb  PDQ COPO  (SEAL) By:  Richar  (SEAL) Attest  Mary L  AUTHENTICATION AC  Signatures authenticated this day of STATE OF WI  Personally  September  AL MEMBER STATE BAR OF WISCONSIN  (If not, authorized by § 706.06, Wis. Stats.)  This instrument was DRAFICO BY  to me known to foregoing instru	RATION  (SEAL)  d A. Meyer, Treasurer  (SEAL)  ou Greeley, Secretary  (KNOWLEDGMENT  SCONSIN  (SEAL)
(is) (is not)  Exception to warranties: easements and restriction  Dated this 28th day of Septemb  PDQ COMO  (SEAL) By:  Richar  (SEAL) Attest  Mary L  AUTHENTICATION AC  Signatures authenticated this day of STATE OF WI  Personally  September  ALMEYER  CITLE: MEMBER STATE BAR OF WISCONSIN  (If not, Greeley, named cor.  This instrument was drafted by  Mark W. Sprenger  Lawy  Mark W. Sprenger	RATION  (SEAL)  d A. Meyer, Treasurer  (SEAL)  ou Greeley, Secretary  the above me, this 28th day of the above named Richard  Treas, and Mary Lou  Secretary, of the above poration.  be the person S. who executed the same and acknowledge the same of the
(is) (is not)  Exception to warranties: easements and restriction  Dated this 28th day of Septemb  PDQ COMO  (SEAL) By:  Richar  (SEAL) Attest  Mary L  AUTHENTICATION AC  Signatures authenticated this day of STATE OF WI  19.  Personally  September  A. Meyer,  Greeley,  named cor  This instrument was drafted by  Mark W. Sprenger  Cary J. C.	RATION  (SEAL)  d A. Meyer, Treasurer  (SEAL)  ou Greeley, Secretary  (SEAL)  (SEAL)  (SEAL)  ou Greeley, Secretary  (SEAL)  (
(is) (is not)  Exception to warranties: easements and restriction  Dated this 28th day of Septemb  PDQ COMO  (SEAL) By:  Richar  (SEAL) Attest  Mary L  AUTHENTICATION AC  Signatures authenticated this day of STATE OF WI  Personally  September  TITLE: MEMBER STATE BAR OF WISCONSIN  (If not, authorized by § 706.06, Wis. Stats.)  THIS INSTRUMENT WAS DRAFTED BY  Mark W. Sprenger  Signatures may be authenticated or acknowledged. Both re not necessary.)  Notary Public  Gary J. C.  Notary Public  Carry J. C.  Notary Public  Greeney.  Andrew Public  Gary J. C.  Notary Public  My Commission	RATION  (SEAL)  d A. Meyer, Treasurer  (SEAL)  ou Greeley, Secretary  the above me, this 28th day of the above named Richard  Treas, and Mary Lou  Secretary, of the above poration, who executed the ment and acknowledge the same [17]

- Arthur Harristy . . . .



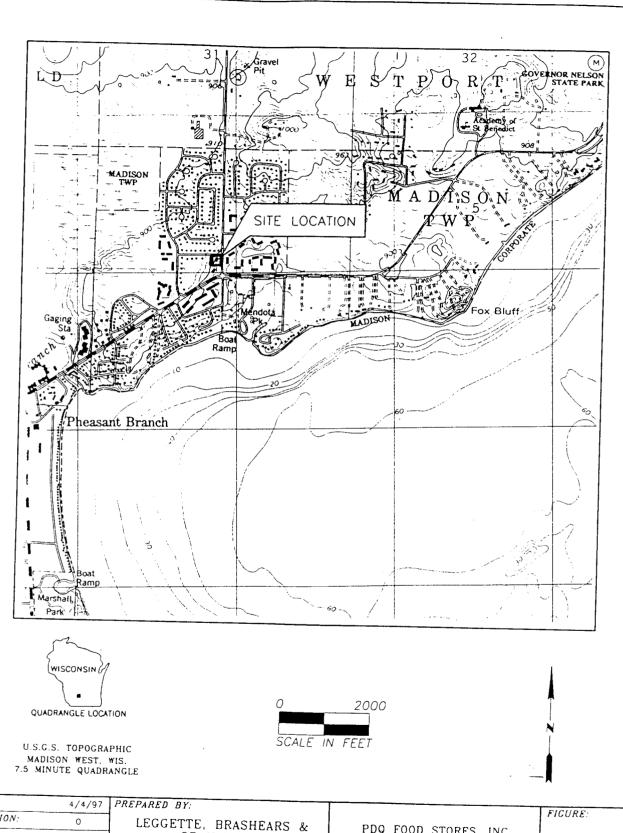
### WTM91 PROJECTION COORDINATES

PDQ Food Store #119
Middleton, Wisconsin
Terracon Project No. 38027032
DNR BRRTS No. 03-13-119840
PECFA Case No. 53562-1202-01

LOCATION	SITE ADDRESS	COORD	INATES
Subject Site	5301 South Ridge Way	562964	293470

562976 293470

Scale 1: 3,839



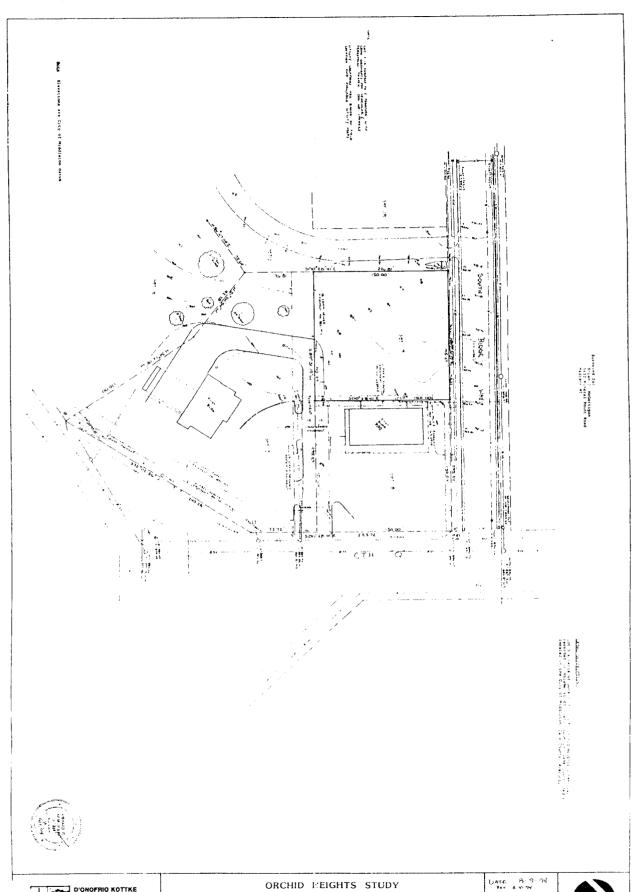
0.00	
DATE:	4/4/97
REVISIO	<b>v</b> : 0
DISK:	J:\10PDQ\PD0119\
FILE:	AREALOC.DWG
DRAWN:	CHECKED:
KSH	
134	

GRAHAM, INC. Professional Ground-Water and Environmental Services 6525 Grand Teton Plaza

Madison, W. 53719 (608) 833-5555

PDQ FOOD STORES, INC. STATION NO. 119 MIDDLETON, WISCONSIN

> AREA LOCATION MAP

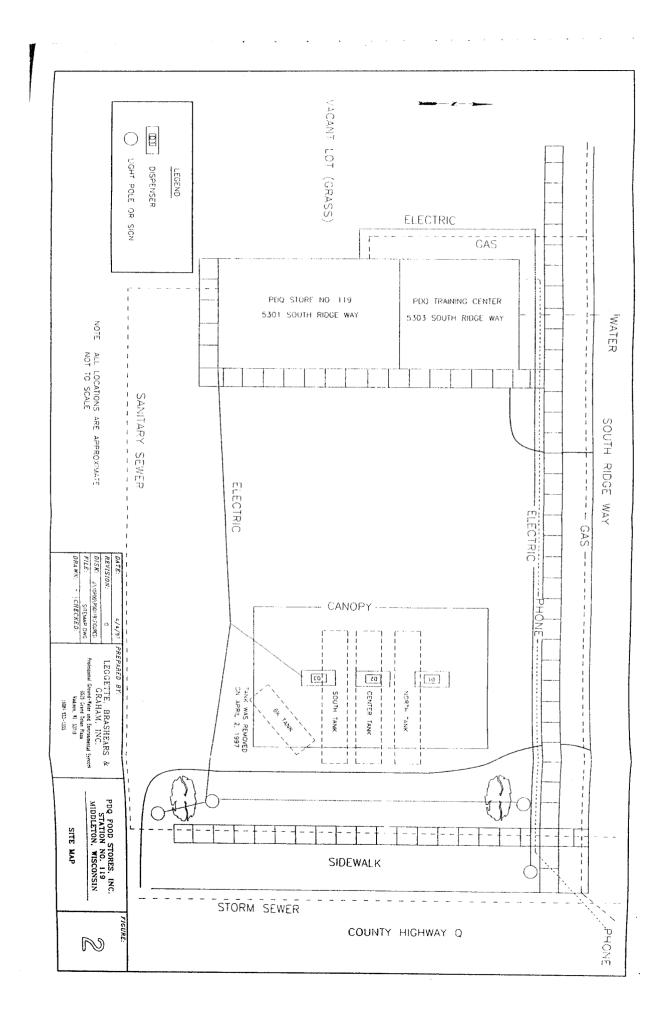


LOTS 1, 7, 8 & 9 ORCHAR HEIGHTS COMMERCIAL PLAT

Located in the NW1/4 & SW174 of Section 6, T7N, R9E, City of Middleton, Dane County, Wisconsin

94.67-178





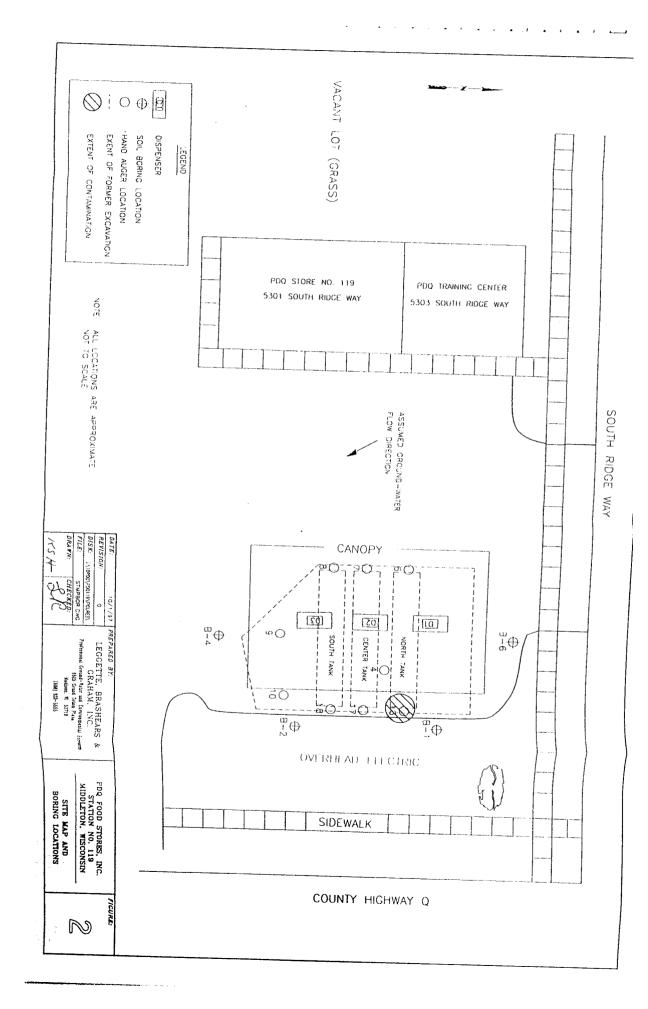


TABLE 2

# STATION NO. 119 5301 SOUTH RIDGE WAY MIDDLETON, WISCONSIN PDQ FOOD STORES, INC.

# APRIL 1997 SOIL QUALITY SUMMARY

(results are in micrograms per kilogram ( $\mu g/kg$ ), except as noted)

Trimethyl-	Sample Date tert-	Date tert-	tert-							1.2.4-	135.		
100	7	Sampled		Buty	Butylmethyl ether	Benzene	Toluene	Ethyl- benzene	Total Xylenes	Trimethyl-	Trimethyl-	GRO (mg/kg)	Lead, ttl.
41         18         254         220         82         2.3           11         <11         <13         <18         <14         0.57           18         <11         <260         210         63         2.3           <8.6         <11         <33         21         <14         <0.40           <8.6         <11         <33         28         <14         <0.40           130         66         1,090         1,200         300         19           10         <11         <58         22         <14         <0.40           2,500         2,400         200,000         200,000         35,000         1,600           <8.6         <11         66         <18         <14         0.62           <8.6         <11         39         <18         <14         <0,40           <8.6         <11         36         <18         <14         <0,40           <8.6         <11         36         <18         <14         <0,40	Residual Contaminant Level				1	2 2	003			Denzene	benzene	(G . B . )	(99)
41         18         254         220         82         2.3           11         <11         <13         <18         <14         0.57           18         <11         260         210         63         2.3           <8.6         <11         <33         21         <14         <0.40           <8.6         <11         <33         28         <14         <0.40           10         <66         1,090         1,200         300         19           10         <11         <58         22         <14         <0.40           2,500         2,400         200,000         200,000         1,600           <8.6         <11         66         <18         <14         0.62           <8.6         <11         39         <18         <14         <0.40           <8.6         <11         36         <18         <0.40           <8.6         <11         36         <18         <14         <0.40           <8.6         <11         36         <18         <14         <0.40						5.5	000.1	2,900	4,100	,	1	100	20
11       < 13       < 23       < 24       2.3         18       < 11	N Tank (W end) 11.5 4/1/97 < 12			< 12		< 7.5	7	81	150	0,00	03		
11       < 13       < 18       < 14       0.57         18       < 11       260       210       63       2.3         < 8.6       < 11       < 33       21       < 14       < 0.40         < 8.6       < 1,090       1,200       300       19         10       < 11       58       22       < 14       < 0.40         2,500       2,400       20,000       200,000       35,000       1,600         < 8.6       < 11       66       < 18       < 14       2.8         < 8.6       < 11       40       < 18       < 14       < 0.40         < 8.6       < 11       < 36       < 18       < 14       < 0.40         < 8.6       < 11       30       < 18       < 14       < 0.40         < 8.6       < 11       36       < 18       < 14       < 0.40	NC Tank (Wend) 11.5 4/1/97 < 12			< 13		367	: -	9 -	#C7	077	7.9	2.3	8. <del>4</del>
18       < 11       260       210       63       2.3         < 8.6				7 7		) '	Ι.		< 33	< 18	< <u>14</u>	0.57	3.4
< 8.6	16/1/4 6:11	16/1/4		71 <		c./ >	18		260	210	63	23	7.7
< 8.6	1  disk Reiti. (3  W) = 12 $4/1/97 < 12$	4/1/97		< 12		< 7.5	9.8 >	\ 	< 33	21	> \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	2.2 >	
< 8.0	Tank Rem. (NE) 12 4/1/97 < 12			<1>		3 ( /	9	,	•	i	•	<b>F</b> .0	0.0
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	1-0	1/1/07		717		٠ ا ا	0.8	<u>-</u>	< 33	28	4 < 14	< 0.40	4.7
10     < 11     58     22     < 14     < 0.40       2,500     2,400     200,000     200,000     35,000     1,600       < 8.6	16/1/# +-0	16/1/4		+7 /		5.7 >	130	99	1,090	1,200	300	10	; <del>-</del>
2,500     2,400     200,000     200,000     35,000     1,600       < 8.6	•	4/1/97		< 12		< 7.5	9	- >	×	, ((	20 /	\$ 5 5 5 V	ř
< 8.6	N lank (E end) 11.5 $4/3/97 < 1200$	4/3/97 <	V	< 1200		< 750	2.500	2.400	200 000	200 000	35 000	04.07	⊄ ; Z (
< 8.6	NC Tank (Flend) 11 4/2/07 / 12			-		(	,	;	2006021	700,000	000,55	1,000	8.7
<ul> <li>&lt; 8.6</li> <li>&lt; 11</li> <li>&lt; 39</li> <li>&lt; 18</li> <li>&lt; 14</li> <li>&lt; 0.62</li> <li>&lt; 8.6</li> <li>&lt; 11</li> <li>&lt; 40</li> <li>&lt; 18</li> <li>&lt; 14</li> <li>&lt; 0.40</li> <li>&lt; 8.6</li> <li>&lt; 11</li> <li>36</li> <li>&lt; 18</li> <li>&lt; 14</li> <li>&lt; 0.45</li> </ul>				71 <		<./>	9.8 >	< II <	99	< 18	< 14	2.8	3 0
<ul> <li>&lt; 8.6</li> <li>&lt; 11</li> <li>&lt; 40</li> <li>&lt; 18</li> <li>&lt; 14</li> <li>&lt; 0.40</li> <li>&lt; 8.6</li> <li>&lt; 11</li> <li>36</li> <li>&lt; 18</li> <li>&lt; 14</li> <li>&lt; 0.40</li> <li></li> </ul>	11 4/3/9/			< 12		< 7.5	9.8 >	= >	30	× - ×			· ·
<ul> <li>5.0</li> <li>5.0</li> <li>6.1</li> <li>6.0</li> <li>7</li> <li>8.6</li> <li>6.1</li> <li>7</li> <li>8</li> <li>8</li> <li>9</li> <li>40</li> <li>40</li> <li>40</li> <li>40</li> <li>40</li> <li>40</li> <li>45</li> <li>45</li> <li>45</li> <li>45</li> <li>45</li> </ul>	N of Basin 11 4/3/97 < 12			< 12		< 1 S	782	: :	` =	01,	<u>+</u> ;	70.0	3.7
< 8.0 < 11 36 < 18 < 14 0.45				: :		6.7	0.0 /	= :	<b>O</b>	× 18	< <u>14</u>	< 0.40	4.2
				71 <		67	0.8 >		36	× 18	<b>+1</b> >	0.45	Y Z

mg/kg ft bg GRO

Milligrams per kilogram.
Feet below grade.
Gasoline range organics.
Compound concentration less than the method detection limit.

Concentration exceeds the Residual Contaminant Level established in NR 720.09.

Not analyzed. ΝĀ

MIDDLETON, WISCONSIN PDQ FOOD STORES, INC. STATION NO. 119 5301 SOUTH RIDGE WAY

TABLE 4

# SEPTEMBER 1997 SOIL QUALITY RESULTS

(results are in micrograms per kilogram (ug/kg), except as noted)

	Sample	DID										
Location	Depth		Date Sampled	Benzene	Toluene	Ethyl-	Total	1,2,4- Trimethyl-	1,3,5- Trimethyl-	tert- Butvimethyl	GRO	Total Pb
-	(1001)	(mdd)				2111221122	v) iciics	benzene	benzene		(mg/kg)	(mg/kg)
i-a	13-13	0.0	9/15/97	< 7.5	9.8 >		< 33	< 19	7.1.7			
B-2	13-15	0 0	4/15/07	31/	0	•	7	7 10	<del>1</del> 7	71 >	< 0.40	< 1.5
Z 2	12.15	9 9	1717117	C. /	< ×.0	<del></del>	< 33	< 18	< 14	< 12	< 0.40	\ \ \ \
<u> </u>	13-13	0.0	9/15/97	< 7.5	9.8 >	->	< 33	× 1.8	7	2		?
B-6	13-15	0.0	9/15/97	< 7 5	98>	: =	, (	01,	<del>1</del>	71 >	< 0.40	< 1.5
				6: 7	0.0		< 33	<u>×</u>	\ <del>4</del>	< 12	070/	- '

: Parts per million.

ppm mg/kg GRO

: Milligrams per kilogram. : Gasoline range organics.

: Indicates concentration is below method detection limit.

### **Statement of Accurate Legal Descriptions**

To the best of my knowledge, the attached property legal descriptions are complete, accurate, and identify those parcels with groundwater impacts originating from the property located at 5301 South Ridge Way in Middleton, Wisconsin (PDQ Food Store #119).

Dawn Lucas

PDQ Food Stores, Inc.

Date

October 31, 2002

WRSPR Partnership 2725 Lyman Lane Madison, WI 53711

Attn: Mr. Bob Wolonec

RE: GIS Registry Residual Contamination Notification

PDQ Food Store #119 5301 South Ridge Way Middleton, Wisconsin

WDNR BRRTS No. 03-13-119840 Commerce No. 53562-1202-01 Terracon Project No. 38027032

Dear Mr. Wolonec:

Soil contamination appears to have originated and been left in place on your property located at 5301 South Ridge Way in Middleton, Wisconsin. The levels toluene, xylenes, and gasoline range organics (GRO) contamination in the soil on your property are above the state soil generic residual contaminant levels (RCLs) found in chapter NR 720, Wisconsin Administrative Code. However, the environmental consultants who have investigated this contamination have informed me that soil contamination extents are stable or receding and will naturally degrade over time. I believe that allowing natural attenuation to complete the cleanup at this site will meet the requirements for case closure that are found in chapter NR 726, Wisconsin Administrative Code, and I will be requesting that the Department of Commerce accept natural attenuation as the final remedy for this site and grant case closure. Closure means that the Department will not be requiring any further investigation or cleanup action to be taken, other than the reliance on natural attenuation.

Since the source of the soil contamination has been identified as a party who leases the property, neither you nor any subsequent owner of your property will be held responsible for investigation or cleanup of this soil contamination, as long as you and any subsequent owners comply with the requirements of section 292.13, Wisconsin Statutes, including allowing access to your property for environmental investigation or cleanup if access is required. For further information on the requirements of section 292.13, Wisconsin Statutes, you may call 1-800-367-6076 for calls originating in Wisconsin, or 608-264-6020 if you are calling from out of state or within the Madison area, to obtain a copy of the Department of Natural Resources' publication #RR-589, Fact Sheet 10: Guidance for Dealing with Properties Affected by Off-Site Contamination.

The Department of Commerce will not review my closure request for at least 30 days after the

date of this letter. As an affected property owner, you have a right to contact the Department to provide any technical information that you may have that indicates that closure should not be granted for this site. If you would like to submit any information to the Department of Commerce that is relevant to this closure request, you should mail that information to: Ralph Smith, P.O. Box 8044. Madison, Wisconsin 53708-8044.

If this case is closed, all properties within the site boundaries where soil contamination exceeds chapter NR 720 soil generic RCLs will be listed on the Department of Natural Resources' geographic information system (GIS) Registry of Closed Remediation Sites. The information on the GIS Registry includes maps showing the location of properties in Wisconsin where soil contamination above chapter NR 720 generic RCLs was found at the time that the case was closed. This GIS Registry will be available to the general public on the Department of Natural Resources' internet web site. Please review the enclosed legal description of your property, and notify me within the next 30 days if the legal description is incorrect.

Should you or any subsequent property owner wish to construct or reconstruct a well on your property, special well construction standards may be necessary to protect the well from the residual soil contamination. Any well driller who proposes to construct a well on your property in the future will first need to call the Diggers Hotline (1-800-242-8511) if your property is located outside of the service area of a municipally owned water system, or contact the Drinking Water program within the Department of Natural Resources if your property is located within the designated service area of a municipally owned water system, to determine if there is a need for special well construction standards.

Once the Department makes a decision on my closure request, it will be documented in a letter. If the Department grants closure, you may obtain a copy of this letter by requesting a copy from me, by writing to the agency address given above or by accessing the DNR GIS Registry of Closed Remediation Sites on the internet at www.dnr.state.wi.us/org/at/et/geo/gwur. A copy of the closure letter is included as part of the site file on the GIS Registry of Closed Remediation Sites.

If you need more information, you may contact me at 8383 Greenway Boulevard, Middleton, Wisconsin 53562 or at (608) 828-2131 or you may contact Ralph Smith with the Department of Commerce at P.O. Box 8044, Madison, Wisconsin 53708-8044 or (608) 261-6543.

Sincerely,

Dawn Lucas

PDQ Food Stores, Inc.

Drux Gucas

# **Fact Sheet**



# What Landowners Should Know: Information About Using Natural Attenuation To Clean Up Contaminated Groundwater

### What Is Natural Attenuation?

Natural attenuation makes use of natural processes in soil and groundwater to contain the spread of contamination and to reduce the amount of contamination from chemical releases.

Natural attenuation is an *in-situ* treatment method. This means that contaminants are left in place while natural attenuation works on them. Natural attenuation is relied upon to clean up contamination that remains after the source of the contamination is removed. An example of a source of contamination would be a leaking underground petroleum tank.

### How Does Natural Attenuation Work?

Natural attenuation processes work at many sites, but the rate and degree of effectiveness varies from property to property, depending upon the type of contaminants present and the physical, chemical and biological characteristics of the soil and groundwater.

Natural attenuation processes can be divided into two broad categories – destructive and non-destructive. Destructive processes destroy contaminants. The most common destructive process is biodegradation.

Non-destructive processes do not destroy the contaminant, but reduce contaminant concentrations in groundwater through dilution.

### Biodegradation

Biodegradation is a process in which microorganisms (e.g. yeast, fungi, or bacteria) that naturally occur in soil and groundwater break down, or degrade, hazardous substances to less toxic or non-toxic substances. Microorganisms, like humans, eat and digest organic compounds for nutrition and energy (organic compounds contain carbon and hydrogen atoms).

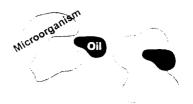
Some types of microorganisms can digest organic substances such as fuels or solvents that are hazardous to humans. Microorganisms break down the organic contaminants into harmless products — mainly carbon dioxide and water. Once the contaminants are degraded, the microorganism populations decline because they have used their food sources. These small populations of microorganisms pose no contaminant or health risk

Many organic contaminants, like petroleum, can be biodegraded by microorganisms in the underground environment. For example, biodegradation processes can effectively cleanse soil and groundwater of hydrocarbon fuels such as gasoline and benzene, toluene, ethylbenzene, and xylene – known as the BTEX compounds, under certain condtions.

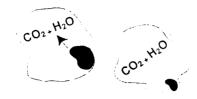


October 2001 RR-671





Microorganisms eat oil or other organic contaminant



Microorganisms digest oil and convert it to carbon dioxide (CO<sub>2</sub>) and water (H<sub>2</sub>O)



Microorganisms give off CO₂ and H₂O

Figure 1. Schematic Diagram of Aerobic Biodegradation in Soil

Biodegradation can also breakdown other contaminants in groundwater such as trichloroethylene (TCE), a chlorinated solvent used in metal cleaning. However, the processes involved are harder to predict and are less effective at contaminant removal compared to petroleum-contaminated sites

### **Dilution and Dispersion**

The effects of dilution and dispersion reduce contaminant concentrations but do not destroy contaminants. Clean water from the surface seeps underground to mix with and dilute contaminated groundwater.

Other processes that lead to reduced concentrations of contaminants include clean groundwater flowing into contaminated areas, and the dispersion of pollutants as they spread out and away from the main path of the contaminated plume.

### Adsorption

Adsorption occurs when contaminants attach or "sorb" to underground particles. Most oily substances (like petroleum compounds) repel water and escape from the groundwater by attaching to organic matter and clay minerals in the subsurface.

This process holds back or retards contaminant movement and reduces the secondarion of contaminants in the groundwater. However, like dilution and dispersion, adsorption does not destroy contaminants.

## Why Consider Natural Attenuation To Clean Up Soil And Groundwater?

In certain situations, natural attenuation is an effective, inexpensive cleanup option and the most appropriate way to remediate some contamination problems. Natural attenuation focuses on confirming and monitoring natural remediation processes rather than relying on engineered or "active" technologies (such as pumping groundwater, treating it above ground, then disposing of the treated water).

Contaminants from petroleum are good candidates for natural attenuation because they are among the most easily destroyed by biodegradation. Natural attenuation is non-invasive, which allows treatment to go on below ground, while the surface can continue to be used.

Natural attenuation can also be less costly than active engineered treatment options, and requires no special equipment, energy source, or disposal of treated soil or groundwater.

# Will Natural Attenuation Work At My Property?

Whether natural attenuation will work at a particular location is determined by investigating the soil and groundwater. These investigations determine the type of contaminants present, the levels of contamination, and the physical and chemical conditions that lead to biodegradation of the contaminants.

In order to rely on natural attenuation, responsible parties are required to confirm that natural attenuation processes are working by monitoring the soil and groundwater over a period of time to show that the contaminant concentrations are decreasing and that the contamination is no longer spreading.

Those conducting the cleanup need to know whether natural attenuation, or any proposed remedy, will reduce the contaminant concentrations in the soil and groundwater to legally acceptable limits within a reasonable period of time.

Natural attenuation may be an acceptable option for sites where active remediation has occurred and has reduced the concentration of contaminants (for instance, removing leaking underground tanks and contaminated soil).

However, natural attenuation is not an appropriate option at all sites. If the contamination has affected a drinking water well, or has entered a stream or lake, active cleanup options may be necessary to make sure people and the environment are protected from direct contact with the contamination.

The speed or rate of natural attenuation processes is typically slow. Monitoring is necessary to show that concentrations decrease at a sufficient rate to ensure that contaminants will not become a health threat in the future.

# Closure Of Contaminated Sites Using Natural Attenuation As A Final Remedy

When contamination is discovered at a property (such as a gas station with leaking underground tanks), the person who is responsible for causing the contamination, and persons having possession or control of hazardous substances that have been discharged, have the responsibility to remove the source of contamination and investigate and clean up the contamination that has escaped into the soil and groundwater.

The contaminant release must be reported to the Wisconsin Department of Natural Resources (DNR) and the site investigation and cleanup are

overseen by a state agency. Depending on the type of contaminant, the oversight agency could be the Department of Agriculture, Trade and Consumer Protection; Department of Commerce; or Department of Natural Resources.

When the cleanup has complied with state standards, the person responsible for the contamination will ask the state agency for closure of the case. If natural attenuation is relied upon to finish cleaning up a contaminated property after closure, the responsible person will need to show that contaminant concentrations are not spreading, that contaminant concentrations are stable or decreasing, and that the concentrations will decrease in the future until state groundwater standards are met.

Because natural attenuation processes are slow, it may take many years before the properties with contamination are clean. State rules require that all owners of properties where groundwater contamination has spread must be informed of the contamination below their property.

In addition, the properties with groundwater contamination exceeding state groundwater enforcement standards must be listed on a database to notify future owners and developers of the presence of contamination. If future monitoring occurs and shows that natural attenuation processes have removed the contaminants to state-required cleanup levels, then the properties can be removed from the database.

The state agency will grant closure if the site investigation and monitoring shows that natural attenuation will clean up groundwater to state standards within a reasonable period of time. All state rules for cleanup must be met and the person who is responsible for the contamination must comply with all conditions of the state's closure approval.

### For More Information

The following publications provide additional information on natural attenuation. Web sites

where these can be downloaded free of charge are also listed.

- A Citizen's Guide to Bioremediation, April 1996, EPA 542-F-96-007; http://www.epa. gov/tio/productions/citguide/natural.htm
- Commonly asked questions regarding the use of natural attenuation for petroleum-contaminated sites at federal facilities; November 20, 2000 http://www.epa.gov/swerffrr/petrol.htm.
- U.S. EPA Technology Fact Sheet: Monitored natural attenuation of petroleum hydrocarbons, May 1999, EPA 600-F-98-021; http://www.epa.gov/ada/download/ fact/pet-hyd.pdf.
- U.S. EPA Technology Fact Sheet: Monitored natural attenuation of chlorinated solvents, May 1999, EPA 600-F-98-0022; http://www.epa.gov/ada/ download/fact/chl-solv.pdf.
- Interim Guidance on Natural Attenuation for Petroleum Releases, WI DNR, Bureau for Remediation and Redevelopment,
  October, 1999, PUB-RR-614; http://www.dnr.state.wi.us/org/aw/rr/archives/pubs/RR614.pdf.

### Contacts

DNR, Central Office
Terry Evanson, Hydrogeologist,
608-266-0941
evanst@dnr.state.wi.us

DNR, Northern Region Office Chris Saari, Hydrogeologist 715-372-8539 ext. 120 saaric@dnr.state.wi.us

DNR, Northeast Region Office Keld Lauridsen, Hydrogeologist 920-492-5921 laurik@dnr.state.wi.us

DNR, South Central Region Office Pat McCutcheon, Team Supervisor 608-275-3241 mccutp@dnr.state.wi.us

DNR, Southeast Region Office Pam Mylotta, Hydrogeologist 414-263-8758 mylotp@dnr.state.wi.us

DNR, West Central Region Office Lisa Gutknecht, Hydrogeologist 715-359-6514 gutknL@dnr.state.wi.us

This document may contain some information about certain state statutes and rules but does not necessarily include all of the details found in the statutes/rules. Readers should consult the actual language of the statutes/rules to answer specific questions.

The Wisconsin Department of Natural Resources provides equal opportunity in its employment, programs, services, and functions under an Affirmative Action Plan. If you have any questions, please write to Equal Opportunity Office, Department of Interior, Washington, D.C. 20240.

This publication is available in alternative format upon request. Please call 608-267-3543 for more information.